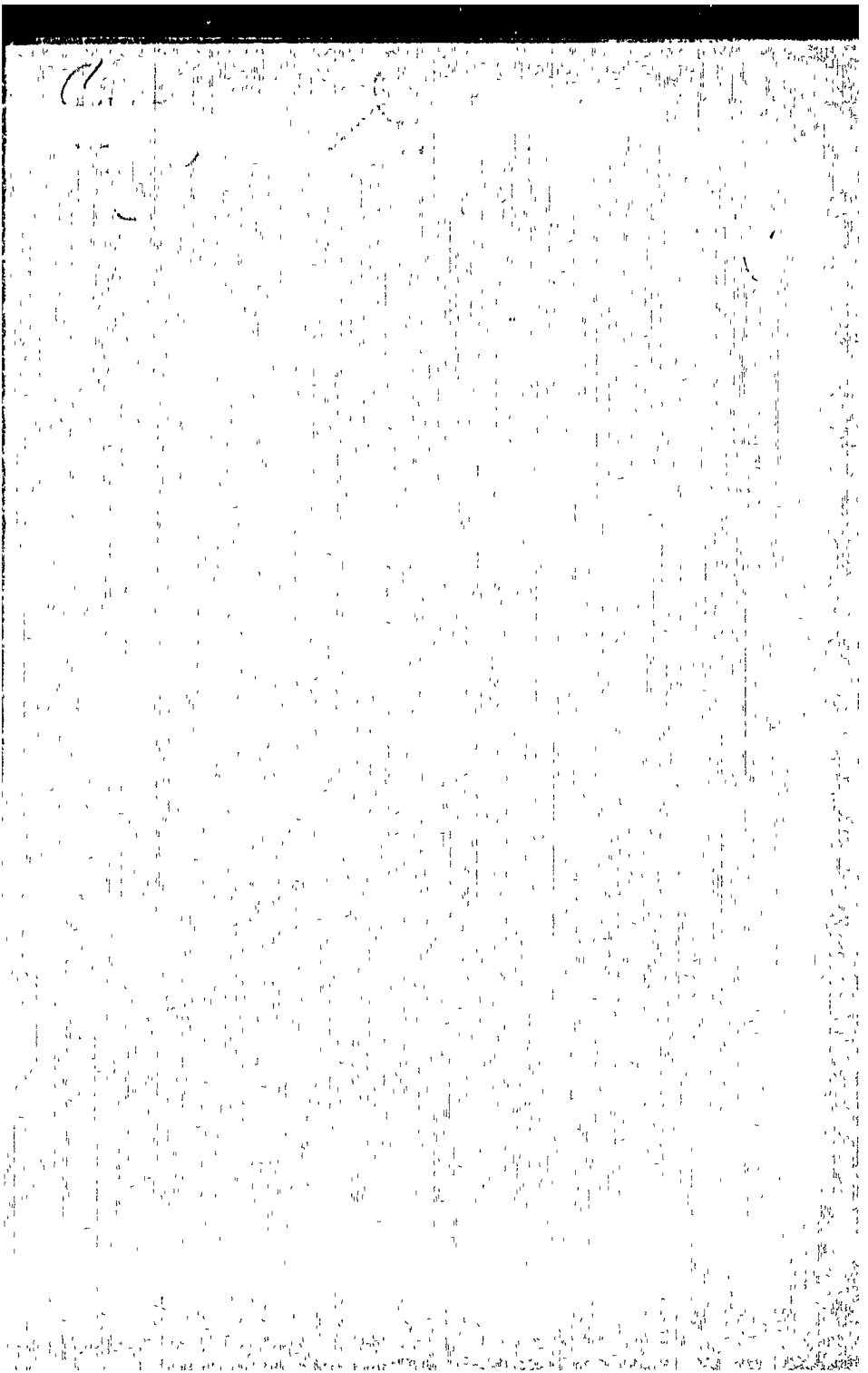
DAWSON

NOTES ON THE APPEARANCE AND MIGRATIONS OF THE LOCUST IN MANITOBA AND THE NORTH-WEST TERRITORIES.



NOTES

ON THE

Appearance and Migrations of the Locust

IN

[illegible] AND THE NORTH-WEST TERRITORIES

DURING THE YEAR [illegible]

By [illegible] M. Dewdney, Esq., [illegible]

(From the Canadian Naturalist.)

NOTES ON THE APPEARANCE AND MIGRATIONS OF THE LOCUST IN MANITOBA AND THE NORTH-WEST TERRITORIES—SUMMER OF 1875.

By George M. Dawson, Assoc. R.S.M., F.G.S.

From the reports now received from Manitoba and various portions of the North-west Territory, and published in abstract with these notes, it would appear that during the summer of 1875 two distinct elements were concerned in the locust manifestation. First, the insects hatching in the Province of Manitoba and surrounding regions from eggs left by the western and north-western invading swarms of the previous autumn; second, a distinct foreign host, moving, for the most part, from south to north. The locusts are known to have hatched in great numbers over almost the entire area of Manitoba, and westward at least as far as Fort Ellice on the Assineboine River (long. 101° 20′) and may probably have been produced, at least sporadically, in other portions of the central regions of the plains; though in the summer of 1874, this district was nearly emptied to recruit the swarms devastating Manitoba and the Western States, and there appears to have been little if any influx to supply their place. Still further west, on the plains along the base of the Rocky Mountains, from the 49th parallel to the Red Deer River, locusts are known to have hatched in considerable numbers—but of these more anon.

Hatching began in Manitoba and adjacent regions in favourable localities as early as May 7th, but does not seem to have become general till about the 15th of the month, and to have continued during the latter part of May and till the 15th of June; while, according to Mr. Gunn and others, in cold clayey land and where pools of water from the melting of the snow lay long, isolated colonies came out at still later dates. Mr. Gunn states that grasshoppers were even noticed to hatch in August and September, in spots which had been covered with water all summer, a fact showing the very persistent vitality of the eggs, and apparently negativing opinions which have been expressed as to their destruction by damp. The most northern locality at which locusts are reported to have been produced from the egg, is at Manitoba House, Manitoba Lake (lat. 51°).

The destruction of crops by the growing insects, in all the settled regions was very great, and in many districts well nigh complete. The exodus of these broods began in the early part of July, but appears to have been most general during the middle and latter part of that month, and first of August. The direction taken on departure was, with very little exception, south-east or south. It is to be remarked, that as there does not seem to have been during this period any remarkable persistency of north-west or northerly winds, the insects must have selected those favouring their intended direction of migration, an instinct which has very generally been observed elsewhere. Though most of the parents, in 1874, came from the west and north-west, and Manitoba must have represented to those ending their flight there, the south-eastern limit of their range; the young insects of 1875 thus took a south-eastward direction, just as though starting from their usual breeding-grounds in the far north-west, and showed no disposition to return to the region whence their parents came. This direction of flight carried many of the insects at once into a country of thick woods, swamps, and lakes; and caused the repetition of the phenomenon of the appearance of grasshoppers in great numbers about the Lake of the Woods, a circumstance only once before noted—in the summer of 1857.* This previous occasion however differed from that of last year in being an extension of an invasion of Manitoba from the west or north-west, and not resulting from insects hatching in that province.

It is probable that most of the grasshopper swarms of Manitoba, thus entering the wooded country, were there harmlessly spent, for though some northern swarms reached the State of Minnesota, the invasion appears to have been comparatively unimportant. Northern swarms are noted to have passed over Crookston (Polk County, Minnesota), and Fort Totten, (Dakota); the greatest number appearing at the latter place July 19th. The locust swarms described by Mr. Riley † in the following paragraph, from information furnished to the *Chicago Tribune*, dated July 13th, probably also came from Manitoba: "The first foreign hoppers appeared on the Sioux City Road, alighting be-

* Not 1867 as erroniously printed in Notes for 1874.

† From Mr. Chas. V. Riley's very interesting Eighth Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri.

tween Lake Crystal and St. James on Wednesday last. A few days later they were observed at New Ulm flying south-east, and at noon of the same day struck the line of the road at Madelina, St. James, Fountain Lake, Windom, and Heron Lake, covering the track for about 50 miles of its length." It will be observed on referring to the summary on another page, that the insects produced in Minnesota itself flew south-west in the early part of July.

I have not been able to trace further the movements of these Manitoba broods, unless indeed it be supposed that some at least of the swarms which passed over central Illinois early in September, came from that quarter. These, however, Mr. Riley believes not to have been the true migratory locust—*Caloptenus spretus.*

Foreign swarms from the south crossed the 49th parallel with a wide front stretching from the 98th to the 108th meridian, and are quite distinguishable from those produced in the country, from the fact that many of them arrived before the latter were mature. These flights constituted the extreme northern part of the army returning northward and north-westward from the states ravaged in the autumn of 1874. They appeared at Fort Ellice on the 13th of June, and at Qu'Appelle Fort on the 17th of the same month, favoured much no doubt by the steady south and south-east winds, which according to the meteorological register at Winnipeg, prevailed on the 12th of June and for about a week thereafter. After their first appearance, however, their subsequent progress seems to have been comparatively slow, and their advancing border very irregular in outline. They are said to have reached Swan Lake House—the most northern point to which they are known to have attained—about July 10; while Fort Pelly, further west, and nearly a degree further south, was reached July 20th, and about seven days were occupied in the journey thence to Swan River Barracks, a distance of only ten miles. It is more than probable that the first southern swarms were followed by others, which mingled with them, or even, in parts of Manitoba and the country immediately west of it, with the indigenous brood. From a few localities only, in Manitoba—and those in its western portion—is the evidence pretty conclusive as to the arrival of foreign swarms from the south. Burnside, Westbourne, Portage La Prairie, Rockwood, and Pigeon Lake, may be mentioned as affording instances.

Many of the grasshoppers observed, according to reports received by Mr. Riley, in Dakota, at Fort Thompson, Yankton, Fort Sully, Springfield, Fort Randall, and Bismark, flying northward and north-westward at various dates in June and July, no doubt eventually found their way north of the 49th parallel. Those seen at Bismark about June 6th and 7th, probably belonged to the earliest southern bands above referred to, and judging from the dates given by Mr. Riley, may have been produced in Nebraska, or more probably even still further south. A portion of the southern and eastern army probably reached Montana, and may even have penetrated in diminished numbers into the districts in the vicinity of Bow River.

Many locusts appear to have hatched at about the same date as in Manitoba, near the extreme western margin of the plains, especially in the country near Bow River. Foreign swarms arrived at Fort McLeod (long. 113° lat. 49° 50′) from the south-west, depositing eggs; most of those hatching near Bow River, and further north, seem to have gone south-eastward early in August. No very definite or wide spread movement of swarms appears, however, to have occurred during the summer of 1875 in this region, nor, if we may judge from the very meagre accounts received, in the corresponding portion of Montana.

The following notes, representing the condition of affairs in the Western States and Territories, south of the 49th parallel, are abstracts of the accounts in Mr. C. V. Riley's work, already referred to, and will serve as a basis of comparison:

Texas and Indian Territory. Hatched in large numbers early in spring in Texas and Indian Territory. Left in May, and early in June, going for the most part north.

Kansas. Ravages confined to districts 150 miles long, 50 broad, along eastern border of State, this being the region where most eggs laid in 1874. Hatching from April 6th to May 10th. Flew north-west in latter part of May and first week in June.

Colorado. Hatched pretty generally over the territory, appearing from early in May till July, according to elevation. Prevalent direction of flight on departure south and south-east.

Nebraska. Hatching ground limited to districts bordering Missouri River. Insects produced early in May, and began to fly northward about June 7th. Several swarms from more southern regions passed north-westward over the State before those hatching here took wing.

Missouri. Hatched early in May, especially in the middle western counties. Began leaving early in June, the majority departing about the middle of the month. Main direction of flight, north-westward.

Iowa. Locusts hatched in a few localities near the south-west boundary of the State. From the 10th of June to the middle of July western counties suffered from swarms passing from south to north.

Minnesota. Hatched pretty generally throughout western part of State. Some appeared as early as April and were killed by cold and wet. The majority left early in July, and appear to have gone south-westward.

Dakota. Known to have hatched near the southern boundary of Manitoba. These insects, and those from further north, went southward early in August. During June, and in August, foreign swarms passed over the State going north-westward.

Montana. Some probably hatched here, and swarms from the east and south-east appeared during July.

During the summer of 1875, the conditions described in the Notes for 1874 as occurring in the region west of the 103rd meridian, were reproduced in Manitoba, and over a great area of the Western and South-western States, with results even more disastrous to the crops than those of the winged invasion of the previous year. We do not hear of any access of fresh swarms to Manitoba from the west or north-west, nor is it probable that any such occurred, notwithstanding the fact that in various parts of the province flights are reported to have passed over from north-west to south-east. From the dates and descriptions given, it seems certain, that these were only those from the more remote parts of the province itself, and in many cases the broods hatched in any locality mingled with those coming from a little distance, and departed at the same time.

The most remarkable and exceptional feature in connection with the appearance of the locusts in 1875, is the extensive invasion of the wooded region east of Manitoba by the swarms produced in the Province. This is the more noticeable when contrasted with the immunity enjoyed by Prince Albert on the Saskatchewan, alluded to in last year's Notes, which is owing to its separation from the general area of the plains by a belt of timber. On writing to Mr. Clarke of Carleton House on the subject, he informs me that this protecting belt of "fir timber"

is only four miles in width, and extends completely across between the north and south branches of the Saskatchewan. Judging from the above remarkable fact, and the known habits of the locust, I do not think that the incursion made into the forest country can be looked upon as anything but exceptional, and perhaps showing that the locusts had lost their reckoning. Nor do I believe that it should discourage the cultivation of belts of woodland, which promises to effect in time a general and permanent amelioration of the grasshopper plague.

Broadly sketched, the movements of the locust in 1875 conform to a general plan. All those hatching in Minnesota, Manitoba, northern Dakota, and in the high western region of the plains at least as far south as Colorado, on obtaining their wings went southward, and this in some instances regardless of the direction from which their parents had arrived in the previous year. Swarms produced in Nebraska, Missouri, Kansas, Texas, and Indian Territory, flew northward and north-westward, returning on the course of their parents, which had flown south-eastward from that quarter. This movement can be traced over an immense area, from the northern borders of Texas almost to the Saskatchewan River.

Evidence appears to be fast accumulating to show that the general and normal direction of flight for any brood, is to return toward the hatching grounds from which their parents came, and it would thus seem, that to complete the migration-cycle of the locust, two years are required. The tendency which the swarms show to migrate on reaching maturity cannot be wondered at, as it is so commonly met with in other animals, and may be assisted by the mere lack of food in the district which has for a long time supported the young locusts. The fact however—let us call it instinct or knowledge—that the young, while amenable to the migratory tendency, show a determination to exercise it in a direction exactly the opposite of the preceding generation, is most remarkable.

No panacea against the grasshopper appears yet to have been found, nor does it seem likely that any such will be discovered. The means of making war upon the young insects and winged swarms, with a degree of efficiency dependent largely on the determination of the people, and density of settlement in the afflicted districts, are now well known. Though it is to be hoped that Manitoba and the settled portions of the North-west may

long escape further trouble from these depredators, it is none the less a duty to prepare for a possible repetition of the scenes which have already been witnessed there. In various portions of the United States, the destruction of the young insects has been greatly encouraged by the payment of bounties for that purpose from the public treasuries, but with a plague so widespread as that of the locust, the means most likely to lead to permanent amelioration are those capable of general application. The movement in the Western States toward the appointment of a commission by the central government to investigate all the facts connected with the locust trouble, and suggest means for its relief, is in the right direction; and if such a commission is appointed, it would appear to be of the greatest importance that Canada should take similar action, and at the same time, for its western territory.

By such general measures as the cultivation and preservation of forest trees, the protection of the prairie grass till the appropriate time for destroying the young insects in their hatching grounds by fire, and the encouragement of all birds feeding on the young or fledged, insect, much may be done. The prairie chicken, and the various species of blackbirds, get the credit of devouring great numbers of the young grasshoppers, and if these were protected by more stringent laws, and even a small increase in safety to the crops resulted, the loss of the one as a game bird and the damage frequently done by the other in the cornfields, would be more than counterbalanced.

The point of prime importance however in the first instance, is to obtain a complete knowledge of the haunts and habits of the insect under discussion, and as a small contribution towards this end these notes are submitted.

Mr. G. M. Dodge of Glencoe County, Nebraska, has published a theory relative to the cause or motive of the migrations of the locust, in the *Canadian Entomologist* for 1875. Mr. Dodge has kindly favoured me with an explanation of this theory. He writes: "I find the insects to be double brooded, flying north in spring to rear a second brood in a region not already devastated. The resulting brood flies south late in autumn, and deposit eggs that lie over winter. This regular movement is complicated by the fact that if the insects of brood first, hatching as far north as this place, should fly north, their progeny might be destroyed by frost; consequently I find that all hatching here or further

north (of brood first) fly south to rear the brood second. I believe with yourself that their natural habitation is the plains east of the mountains, and think that their occasional invasion of the States is due to the prevailing winds." After giving several instances from Nebraska bearing on his theory, Mr. Dodge, referring to my Notes on the Locust Invasion of 1874, says: "In your items from various localities, I find a point that bears directly upon the double brooded character of the insect, but which may have escaped your notice. In the notes from Fort Ellice, Headingly, Rockwood, Scratching River, Winnipeg, Stone Fort, and St. Anne's, eggs are said to have hatched in autumn; and in *each case* grasshoppers are reported as coming from the *south* early in the season. These were of course of brood first; brood second coming always from a northerly direction would deposit eggs for the next spring's brood, and none of them would hatch in autumn."

I do not think Mr. Dodge's theory can be accepted in its entirety, though the locust may occasionally complete two generations in one season, when the circumstances would no doubt be as above supposed. Certain it is, however, that southern swarms seldom if ever reach the country north of the 49th parallel in time to allow a second brood to reach maturity, even if the eggs hatch in summer or autumn. The date of arrival of the first swarms in Manitoba in 1874 was considered exceptionally early, and yet it is believed that all their progeny hatching during the autumn were destroyed by frost.

The Hon. D. Gunn has favoured me with the following historical notes on the grasshopper, going back to the earliest settlement of the Red River country:

"The first appearance of the locusts in this land, of which we have any account, took place on the 18th of July, 1818, six years after the commencement of the colony. At that period of the season the wheat was well advanced towards maturity, and sufficiently strong to resist the voracious destroyers. But it fared otherwise with the barley. The locusts attacked the plants a few inches below the ear, and cut them off as neatly as if cut off by the hand of man with a pair of shears. However on this occasion nothing was lost; every ear that fell to the ground was carefully gathered up. The potatoes were injured to some extent, but all garden vegetables were devoured. Their eggs deposited, incited by instinct or pressed by hunger, they

departed. In the following spring the young locusts began to appear, and before the latter end of May, 1819, the whole country was literally covered with them, and the rising crops of every kind entirely devoured. These in due time left to invade some other region. The opinion of the settlers who were here at the time was that they flew to the north and were driven by a strong south wind into Lake Winnipeg and drowned in such great numbers that the waves heaped them up, in some parts of the western shore, to a depth of several feet. As soon as these had taken their flight, fresh swarms poured in from the south-west, but found nothing to devour but the stinted natural grasses of the plains, which their predecessors had eaten to the very roots. Notwithstanding the scantiness of their diet, they deposited their eggs in great numbers, which the warmth of the following spring ushered into life. At the usual time, the latter end of July and first week of August, they disappeared, and from 1820 to 1857 the country was free from the inroads of these formidable destroyers. In 1857 a considerable swarm of locusts visited the settlements on the lower Assiniboine in the latter end of July, but these did not extend in any considerable numbers towards lower Fort Garry. They deposited their eggs over what is now known as Headingly and White Horse Plain parishes, and in the spring of 1858 the young progeny destroyed the crops in the above-mentioned region, say a distance of twelve or fifteen miles. These after they attained their full growth, as usual left the country. In 1864 another invasion took place, great numbers of them fell on each side of the Assiniboine, and extended down to upper Fort Garry. On the 7th of July they flew in great numbers over the lower settlement. They were driven by a fresh breeze from the west, some of them appeared to be at a great height from the earth, the living mass extending downward to the height of a few feet from the surface, numbers of the lowermost falling continually to the ground. The foremost part of the cloud began to pass over this place at 10 a.m., and they continued flying for some time after 2 p.m., and during the time of their flight they had fallen in such numbers that from twelve to twenty were counted on a square foot of surface. After a short rest, those which had alighted on ploughed lands and on barren spots moved into corn-fields and began feeding on the leaves of the wheat plant, and according to their usual habit cut off the heads of the barley. Here I had an opportu-

nity of observing that, as a rule, they do not pass the night, under ordinary circumstances, on the ground, but climb upon pickets, fencing, and on every other object on which they can roost. On the tenth of July they were seen pairing and depositing their ova. In the first week of September they disappeared. In the beginning of May, 1865, the young ones began to appear. On the 9th of June, 1865, a swarm of locusts came from the south. They extended from the west side of Lake Manitoba to Fort Alexander on the east. They fell in great numbers in that lake and on its eastern shore, but were very sparsely scattered over the country to the east of the above body of water. However those which were hatched in the spring, and those that came in June did not seriously injure the growing crops, and the farmers reaped an abundant harvest. In 1867 the locusts made their appearance in very great numbers, but came about the beginning of August, and consequently did not do much injury to the wheat crops, but many of the farmers had hard work to save the barley and oats. These, according to their habit, deposited their eggs in great numbers, and departed to die in some other place, either to the east or south-east of this place. The river ice began to break up on the 24th of April, 1868, and on the 7th of May I took the following note: 'Grasshoppers moving about, color pale white, not much bigger than fleas.' On the 22nd of the same month their numbers had greatly increased, and some had become brown. They evidently continued coming out of the ground during the whole month of May, and a few perhaps during the first ten days of June. All the grain of every kind that was growing was eaten up by them before they took their departure, which was in the end of July and during the first week of August. After this none were seen until 1872, when on the 5th of August they appeared. By the 12th they had become very numerous, and on the 14th they were depositing their eggs. In the first week of September many of them had taken their departure, and all disappeared by the last of that month. Their offspring began to appear about the middle of May, and by the middle of June the whole country was literally covered with them, no grain had been sown, the potatoe vines had been consumed, and even the pasture on the plains suffered greatly from their ravages. However they left about the usual time. The next and last visitation we had from these living plagues was in July, 1874. On the 17th immense

swarms for some hours flew over the city of Winnipeg; at the same time thousands of them were coming to the ground. In a few days after they extended their excursion to Lake Winnipeg, but numbers of them left before they had deposited their eggs. Yet millions of eggs were deposited, but as the last spring, 1875, was very late, the ground kept cold during the most part of the month of May, the locusts were very late in being hatched; some made their appearance about the 10th of May, and others as late as the last week in that month. They were numerous in some places; however I am of opinion that if the people had made a combined effort to destroy them during the first and second weeks of their existence, could not have failed in destroying many of them, and would by so doing, had they sown or planted, have raised both wheat and potatoes. Most people however became discouraged, and could not be persuaded to make the least effort to rid the land of the plague."

I have to thank the various gentlemen who have kindly replied in answer to my circular asking information, and beg to suggest that in all cases of the appearance of the locust, careful notes be kept as to dates, directions of flight, &c.

In the subjoined digest of the more important items received from the various localities, the places are arranged in order from west to east.

Fort McLeod, North-west Territory. (R. B. Merritt, M.D.) No young insects observed. Foreign swarms arrived July 19th from the south-west, and continued passing, or on the ground—though most of them went on—till about August 25th; went north-westward. Eggs were deposited and some known to have hatched in the autumn. No cultivation here, but 25 per cent. of prairie grass eaten. Mr. Merritt adds: "In April, 1876, many young black hoppers seen around Fort McLeod. On my trip from Bow River, I saw a tract of country 70 miles wide covered with young grasshoppers. They appeared to be eating the grass, and only moving when disturbed."

Morleyville, Bow River, N. W. T. (J. Macdougall.) Produced here from the egg, hatching May 20th. Left in August going southward. A great swarm arrived on the wing from the northward about August 10th, the main body passed overhead

in about six hours going southward, while some remained several days on the ground. Some eggs deposited. Crops, represented by a small patch of potatoes, were not hurt.

Bow River, N. W. T. (J. Brown.) Produced here from the egg, hatching about the first of May; flew south-eastward from Oct. 1st to 15th. Winged swarms arrived late in July or about first of August, from the north and north-west, passing on for the most part, but depositing some eggs. The small quantity of crops put in were lost. Wild grasses in many places much injured, though bunch-grass of mountains untouched. Eggs hatched spring of 1876, and insects on July 25th almost ready to fly.

Plains between Fort McLeod and Edmonton, N.W.T. (Rev. Constantine Scollen.) Produced in large numbers from the egg, hatching about June 1st. Left toward the latter part of August, going north and north-east. Great swarms appeared on the wing from the south and south-west August 1st, some alighting and others continuing their flight. Continued arriving till August 15th, and departing north and north-east, those produced in the country accompanying them. Eggs deposited during latter part of August, none known to have hatched in autumn. Ma. Scollen adds: "I may remark that the grasshopper during the last four years it has visited this country, has always come from and gone on in the same direction. They have always stopped about 60 miles south of Edmonton, perhaps owing to the densely wooded country in that vicinity." No cultivation in this region.

Edmonton, N. W. T. (R. Hardisty.) The locust did not appear here. Mr. Hardisty writing from an experience of twenty years, states that he has never known the insect to appear at Edmonton, though he has often seen them in large numbers about fifty miles south of that place. Edmonton is about forty miles from the northern edge of the plains, and separated from them by country *well wooded* with small poplar and pine, and having many small lakes, and swamps with strong heavy grass.

Country between Battle and Red Deer Rivers, N.W.T. (W. McKay.) Grasshoppers did not appear in this region during the summer of 1875.

Bozeman, Montana. (J. Wright.) Not produced from the egg. Arrived on the wing, appearing first on the 8th of July, but continued passing overhead in large swarms from the east for some time.

Victoria, Saskatchewan, N.W.T. (Chas. Adams.) Did not appear here.

Carleton House, N.W.T. (L. Clarke.) Did not appear in this vicinity. Mr. Clarke writes: "From traders I have learned that grasshoppers appeared in great numbers about 130 miles to the south-west of Carleton. Again, they were seen to the south-east of Touchwood Hills as far east as Fort Pelly, destroying the crops at that station.

Touchwood Hills Post, N. W. T. (R. W. Ells, Geological Survey of Canada.) Not produced from the egg here, but arrived on the wing, flying north-west. Very numerous July 30. Mr. Ells did not see any grasshoppers west of the Touchwood Hills.

Fort Qu'Appelle, N.W.T. (W. J. McLean.) Not produced here from the egg. Full grown insects appeared in myriads, June 17th, coming from the south.

Fort Pelly, N. W. T. (A. McBeath.) Not hatched here. Swarms arrived on the wing, July 20th, from the south, and passed on northward. All crops destroyed. Eggs deposited, and none hatched in autumn. Mr. McBeath writes,—After the grasshoppers made their appearance here on the 20th of July, their progress was very slow. The Mounted Police barracks are some ten miles north of this place, yet they took two weeks to reach there. For a time it appeared that this place was the end of their journey, and they diminished very slowly. Many were killed by the frost. As far as I could learn they did not go further north than about 30 miles from here. Shortly after their arrival they began depositing their eggs, and dying, till the ground was covered with their dead bodies.

Swan River Barracks, Pelly, N.W.T. (lat. 51° 53′, long. 101° 59′. J. H. Kittson, M.D.) Not produced here, arrived on the wing July 27, from the south. Continued passing till Aug. 20, going in a direction north-west by north. Some remained, and eggs in considerable quantity deposited. Late in autumn insects remaining after depositing eggs were destroyed by small red parasites.

Fort Ellice, N.W.T. (A. McDonald and R. W. Ells.) Produced here from the egg, hatching about May 6th. By June 7th all growing crops destroyed. Left in the beginning of

August, going south-east. On June 13th swarms arrived on the wing from the south or south-east, and at once began to deposit eggs. The first that arrived did not remain long on the ground. A second swarm arrived on the 10th of July, and about two days afterwards a third lot appeared. These also deposited eggs, the last remaining till the beginning of September. All crops destroyed—oats and barley. No eggs hatched in autumn. Mr. Ells writes that eggs were deposited at Fort Ellice as early as the 20th of June.

Swan Lake House, N.W.T. (D. McDonald.) A few locusts observed to arrive on the wing about July 10th, coming from south by south-west. These appear to have deposited some eggs which hatching in September produced young insects which were either frozen, or took flight August first, in a direction between south and east. No crops destroyed, the locusts having arrived late and in small numbers.

Manitoba House, N. W. T. (J. Cowie, J. P.) Produced here from the egg, hatching about June 9th. Left about the end of July, going north. Swarms also arrived on the wing, some remaining on the ground, and some passing over. From the middle of June till the end of July they came with every south-east wind, the latest remaining altogether, the earlier swarms going north. Mr. Cowie writes: "The young before taking wing marched through the settlement from S. to N., and destroyed all the crops except potatoes. Some returned on foot going south, and some remained until able to fly."

Fort Totten, Dakota. (Dr. J. B. Ferguson.) No locusts hatched here. Foreign swarms appeared July 19, coming from the north, and departing finally about July 22 or 23; going southward. Little damage done to crops. No eggs deposited. Dr. Ferguson writes:—The 19th of July is the date when locusts first appeared here in large numbers and alighted on the ground. Swarms were seen passing over before this date, but no note made of the exact day. Those that came on the 19th remained 3 or 4 days, and then left. It rarely happens that a swarm passes without some coming down, while others already here appear to rise and join them in the air. In this way even after the great body of locusts has passed, considerable numbers remain behind, and do not entirely disappear for from 10 to 12 days, and sometimes even longer.

Woodside, Man. (Thos. Collins) Produced here from the egg, *hatching from about the 20th of May till the end of June.* Most took their departure about the middle of July, but a considerable number remained till the first week in August. Went south-eastward. A winged swarm arrived from west-north-west about the third week in July; remained a short time and departed south-eastward. Whole grain crop destroyed, estimated at 6,700 bushels for Woodside, Pine Creek, and Squirrel Creek. *A few potatoes escaped. Very few eggs deposited.*

Westbourne, Man. (P. Garriock.) Produced here from the egg, hatching from the *10th to the 15th of May. Began their* departure about 1st of July, and continued leaving till some time in August, going south-east. Great swarms were observed at two or three different times, many alighting, while the rest passed on. These arrived about the first of July, coming as a rule from the north-west and going south-east. Disappeared during latter part of July and first of August. Grain crop *would probably have amounted to 4000 or 5000 bushels,* but all destroyed except about 50 bushels. Few eggs deposited. Mr. Garriock writes:—Some time in the beginning of June, if I remember rightly, great swarms of grasshoppers, quite different in colour and size from all that had ever visited this country, came from due south, and passed on to the north-west. Great numbers alighted, but after remaining but a few hours, they rose again, *and followed the main body. They appeared to us to be a very* peculiar species of the detestable grasshopper, in size at least one-third larger than the pest with which we have become too well acquainted, and of leaden colour.

Burnside, Man. (K. McKenzie.) Produced here from the egg, hatching from the 10th to the 24th of May on warm sandy ridges, from that date till the middle of June in heavier cold soils. Left from July 8th to about first week in August, disappearing gradually, but generally going east or north-east. Winged swarms arrived *in July, and for the most part passed* overhead. Came from west or south-west, and left generally eastward. A few arrived on the wing during the first week in June. In Palestine district whole crop destroyed. In Portage, High Bluff, and Poplar Point districts, about 40,000 bushels of grain harvested, probably about one-tenth of the crop. Potatoes gave about one-fourth crop. No eggs deposited here. Mr.

McKenzie says it is reported that eggs were deposited west of Manitoba Lake, about one hundred miles north-west of Burnside.

Portage la Prairie, Man. (C. Mair, J. Cowan, M.P.P.) Produced here from the egg, hatching from the middle of May to middle of June. Began to leave about middle of July, going south-east. Winged swarms passed overhead from the latter part of July till the middle of August, coming generally from the south-west and going south-east: few alighted. Two-thirds to four-fifths of crop destroyed. In Portage la Prairie, Electoral Division, about 12 miles square, the grain crop should have been 200,000 bushels; 40,000 bushels actually harvested. In High Bluff Electoral Division, loss greater in proportion, only 10,000 bushels of grain saved and a half crop of potatoes. Mr. Cowan writes that some winged swarms appeared from the south early in June, long before those hatched here could fly.

High Bluff, Man. (J. A. K. Drummond) Produced here from the egg, hatching May 15th to June 15th. Left about the middle of July, going for the most part south-east. A winged swarm arrived from the west July 19th, and swarms continued arriving from this direction, and departing, generally south eastward till the latter part of August. Greater part of crops destroyed. No eggs deposited.

Gladstone, Man. (C. P. Brown.) Produced here from the egg, hatching June and July. Left about the last of August, going south-eastward. About July 17th a few winged swarms arrived from the west, leaving in same direction as those produced here. Crop, amounting to from 20,000 to 30,000 bushels destroyed. No eggs deposited.

Poplar Point, Man. (L. W. McLean.) Produced from the egg, hatching from the 20th of May till the 10th of June. Took flight about the 2nd of July, and continued flying till the 10th of August or thereabout; went south-east. Some swarms seen on the wing at dates above given were supposed to have hatched in the western and north-western parts of the province, or beyond the province line. These appear to have mingled with those produced in the locality itself, in their flight. Only crops planted, potatoes, which generally gave pretty good returns. No eggs deposited.

Oak Point, Manitoba Lake, Man. (J. Clarke.) Produced here from the egg, hatching about June first. Left about the end of July, going south west. No winged swarms observed to arrive. No grain sown. Potatoes and hay meadows considerably damaged. No eggs known to have been deposited.

Pigeon Lake, Man. (J. M. Haure.) Produced here from the egg, hatching from 15th of May till 15th of July. Commenced flying July 10th, and continued leaving till the middle of August, going south and south-east. Foreign swarms seen at various time—first on July 1st—passing overhead. These came from south and south-west, and went north-westward as a rule. No grain raised in Parish of François Xavier. No eggs known to have been deposited.

St. François Xavier West, Man. (F. Dauphenais.) Produced here from the egg, hatching early in May. Began to leave about the 10th of July, going south. Locusts arrived on the wing from the south-west about the 25th of July. Said to have kept coming and going, occasionally alighting. Left early in August, going south. Three-fourths of crop in the parish destroyed. No eggs deposited.

Headingly, Man. (J. Taylor.) Produced here from the egg, hatching about the end of May. Left from the middle to the end of August, going southward. Winged swarms arrived from various directions, but more especially from the south. Myriads lit about the 20th of July. Eventually flew southward with those hatched here. Three-quarters of crop, or probably about 10,000 bushels destroyed. No eggs deposited.

St. Charles, Man. (A. Murray, M.P.P.) Produced here from the egg, hatching from about the 10th of May to July 1st in successive swarms. On arriving at maturity went south-eastward. About July 10th winged swarms arrived from the west, and left in the same direction as those produced here, the latter in many cases rising and mingling with them. Entire grain crop destroyed, and only a few inferior potatoes harvested. No eggs deposited.

Rockwood, Man. (J. Robinson.) Produced here from the egg, hatching about the middle of June. Left about the last of August, going south-east. Swarms passed overhead about July first, coming from the south. All crops destroyed.

West Lynne, Man. (H. G. Lewis.) Produced here from the egg, hatching about the 20th of May, and leaving southward toward the end of July. Swarms are said to have arrived from the south, and to have left again going southward, about the date last given. Two-thirds of crop destroyed. No eggs deposited.

Selkirk, Man. (A. A. Ross.) Produced here from the egg, hatching from the 10th of May, till the 10th of July. Left in latter part of July, going south-eastward. A few swarms arrived on the wing and alighted on the 29th of July. These left with those produced in the district. Scarcely any grain sown. Potatoes put in late, were harvested without much damage. No eggs deposited.

Winnipeg, Man. (Wm. Hespeler, F. Cornish, C. Inkster.) Produced here from the egg, hatching during latter part of May and first of June. Began to leave in second week in July, going as a rule south and south-east. Winged swarms from the north-west observed about the middle of July; generally passing overhead without alighting. Flew in same direction with those hatched here. Little crop put in, and more than three-fourths of that destroyed. No eggs deposited.

St. Boniface, Man. (Hon. M. A. Girard) Produced here from the egg, beginning to appear in May. Left during August, going eastward. From the 15th of July to the 15th of August other swarms arrived from the south and west, and for the most part passed overhead going north and east. Few eggs deposited. Twenty-four twenty-fifths of crop destroyed.

St. Norbert, Man. (J. Lemay.) Produced here from the egg, hatching about the middle of May. Began leaving about the 22nd July, going west. Nine-tenths of crop, amounting to about 25,000 bushels, destroyed. No eggs deposited.

Parish of St. Vital, Man. (S. Hamilton.) Produced here from the egg, beginning to hatch out early in May. Left about the end of August, going south-south-east. Some swarms arrived on the wing about the 15th and 20th of June from the north-westward, and left at about the same time, and in the same direction, as those produced here. All crops, save a few fields of pease, destroyed. Eggs deposited during the summer, but young insects hatched and destroyed by frost.

St. Vital, Man. (A. Gaudry) Locusts hatched here about about the first of June, and on obtaining their wings left, going north-east. Foreign swarms not mentioned.

Middle Church, Man. (J. Clouston.) Produced here from the egg, hatching from about May 15th till June 15th. Left in August, going south; all gone before August 15th. No foreign swarms mentioned. All crops sown were lost. No eggs deposited.

Little Britain, Man. (Hon. D. Gunn) Produced here from the egg, hatching from about May 7th till the middle of June, and a few even later. Some began to fly off about July 20th, others between that date and the 20th of August, and a few seen as late as the 8th or 10th of September. At first a few flew to the north, but returned, and all at length flew to the east and south-east. Very little grain sown, and all destroyed. No eggs deposited. Mr. Gunn writes that some eggs were deposited in the vicinity of Lake Winnipeg in the autumn of 1875.

Lower Fort Garry, Man. (Wm. Flett) Produced here from the egg, hatching during the greater part of the month of May. Most left during the latter part of July, though some still to be found till about middle of August; generally went south-east. No foreign swarms. No eggs deposited.

Springfield, Man. (F. Dick) Produced here from the egg, hatching May 15th to June 1st. Left during latter part of July and August, going south-east. About July 15th swarms appeared from west and north-west, and continued to pass over, alighting sometimes for the night, till about August 6th. In Electoral District of Springfield only about 700 acres sown. Crop saved on 25 acres only and even this much damaged.

Eagles Nest, Man. (J. Monkman.) Produced here from the egg, hatching from May 20th to July 15th. Left July 15th, going east-south-east. Winged swarms observed to pass overhead, some alighting. First noticed July 1st, and continued until August. Came from west-north-west, and went east-south-east. No eggs deposited.

Cook's Creek, Man. (G. Miller.) Produced here from the egg, hatching about the first of May. Departed about the first of August, going south-east. Swarms also passed overhead about August first, coming from the north-west, and going in the direction aforesaid. Total destruction of crops.

Crookston, Minn. (E. M. Walsh.) A few locusts produced here from the egg, hatching from May 15th to June 10th. Left July 15th, going south and south-east. These did little damage. Swarms appeared on the wing from the north, and passed south-eastward, about July 20th. Crops not injured. No eggs deposited.

North-West Angle, Lake of the Woods. (M. M. Thompson.) No locusts hatched here. Swarms arrived on the wing about August first from the north-west, and left again about the 20th of August, going south-east. Only crops put in potatoes, which were nearly all destroyed. No eggs or young insects observed in the autumn.

Mr. Thompson writes that these notes will apply equally to *Broken Head, White Mouth,* and *Birch River.* These are stations in the wooded district east of the Red River Prairie, and on the road between Winnipeg and Lake of the Woods.